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INTRODUCTION

The information contained in this document is of a preliminary nature and deals only with the essentials required for flight line handling.

These data are to be used as interim material until the information is included in the appropriate section of the Organizational Maintenance Manual for U2 aircraft.

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DESCRIPTION

1-1. APN-135 (MODIFIED) RENDEZVOUS RADAR BEACON.

1-2. GENERAL. (See figure 1-1 through 1-3)

1-3. This document contains preliminary data on the Bendix, P/N 1067190-0-3 (modified), Radar Receiver-Transmitter and associated antenna and control panel.

1-4. The general areas of component installation in the aircraft are illustrated in figure 1-2.

1-5. PURPOSE.

1-6. The AN/APN-135 (modified) beacon is an X-band airborne radar rendezvous beacon designed to serve as a navigational aid. The beacon is operated in conjunction with X-band radar systems equipped with appropriate beacon interrogating facilities. In response to an appropriate interrogating signal from a radar system the beacon transmits a coded reply which results in a presentation on the radar display indicating the range, bearing, and identity, of the beacon-equipped aircraft.

1-7. FUNCTIONAL DESCRIPTION.

1-8. INTERROGATION.

1-9. The beacon provides a means for responding to proper interrogating signals and is triggered by any radar equipped with X-band beacon interrogating facilities. Pulse width discrimination prevents beacon response to X-band radars operating in search, intercept, or weather modes. Radars performing these functions normally employ pulse widths other than that required to trigger the beacon.

1-10. REPLY.

1-11. In response to the proper interrogating signal the beacon transmits a coded reply. The coded reply transmitted by the beacon enables the operator of the other aircraft interrogating radar to identify the beacon-equipped aircraft and determine its range and bearing.

1-12. SYSTEM OPERATION.

1-13. GENERAL.

1-14. The AN/APN-135 (modified) beacon operates on 28 volts dc and 115 volts ac, 3-phase 400 cycle current from the main inverter bus.

1-15. The beacon reply consists of r-f pulses arranged in any one of at least 53 possible code combinations. The beacon provides for code combinations of from one to nine pulses selected by switches on the coder on the receiver-transmitter unit.

1-16. When the control is in STBY position, and system is being interrogated, an aural signal is applied to the headset. The signal level is controlled by the VOL control rheostat and beacon does not transmit.

1-17. When the control is in OPR the amber TRANS ON light will glow and an aural signal is applied to the headset to acknowledge that the beacon is replying to an interrogation.

WARNING

Do not operate beacon during refueling operations.

1-18. BEACON OPERATION.

- a. Turn main inverter switch to NORMAL and the battery switch to BAT or GEN & BAT.
- b. Turn beacon on by turning the power switch to STBY. (Approximately one minute warm-up time is required.)
- c. Turn volume control full clockwise then adjust to desired level when signal is received.
- d. When aural signal is received and a beacon reply is required turn power switch to OPR.

Note

The TRANS ON light will glow and an aural signal will be heard whenever a beacon reply is made.

- e. To turn set off turn power switch to OFF.

WARNING

Turn beacon off before refueling.

1-19. MAJOR SYSTEM COMPONENTS. (See figure 1-2.)

1-20. The major system components are:

- a. A radar receiver-transmitter, Bendix P/N 106190-0-3 (modified).
- b. A coder which forms code groups used in the reply signal. (The coder is a component of the receiver-transmitter.)
- c. A control panel, R-471. (See figure 1-1.)

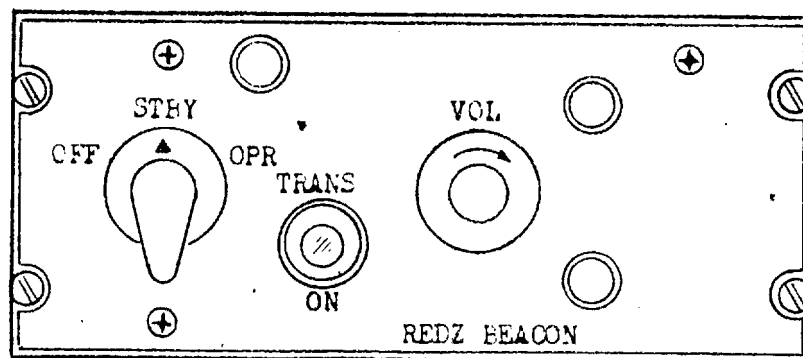
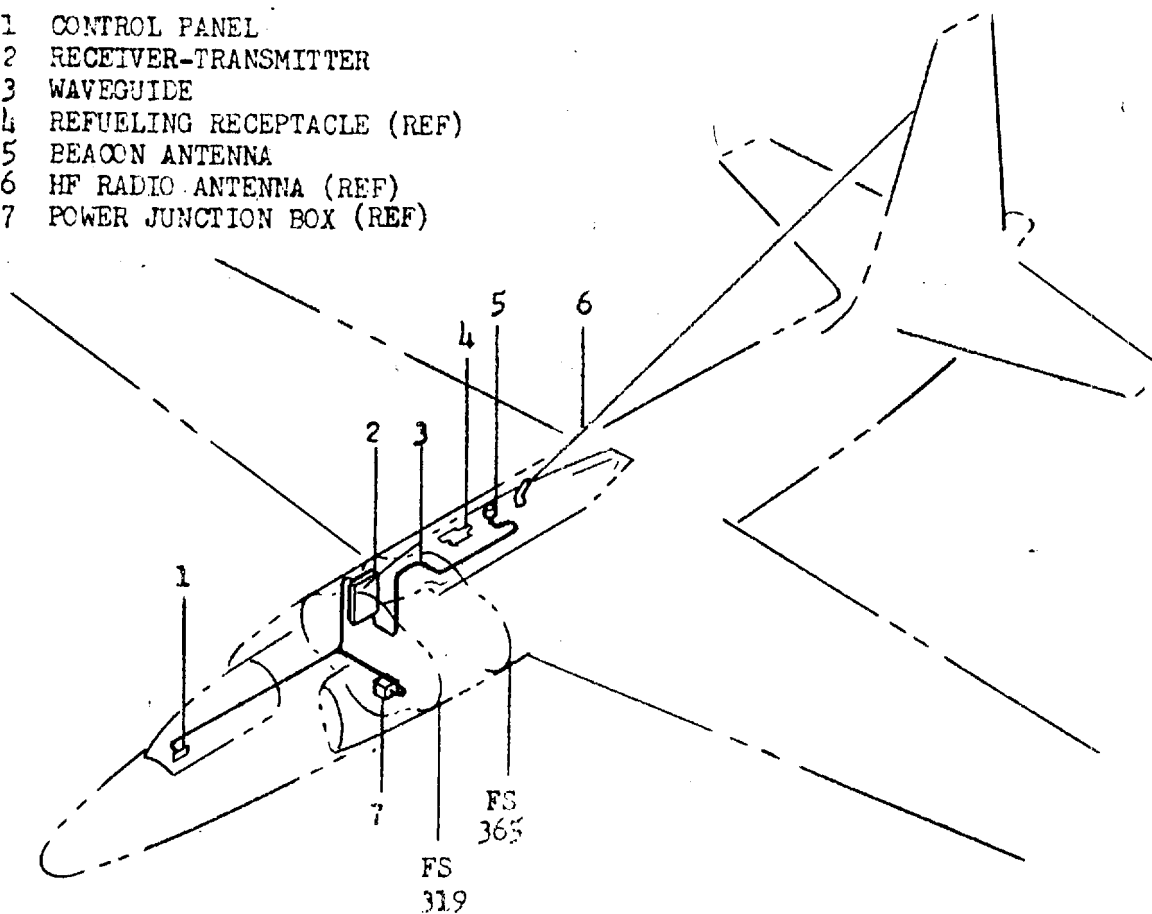


Figure 1-1. APN-135 Beacon Control Panel

- 1 CONTROL PANEL
- 2 RECEIVER-TRANSMITTER
- 3 WAVEGUIDE
- 4 REFUELING RECEPTACLE (REF)
- 5 BEACON ANTENNA
- 6 HF RADIO ANTENNA (REF)
- 7 POWER JUNCTION BOX (REF)



d. A fixed antenna, omnidirectional in the horizontal plane, Bendix P/N 3136704 (APN-135, modified).

1-21. RECEIVER-TRANSMITTER UNIT.

1-22. The receiver-transmitter unit is mounted in the right hand cheek. The coder switches are mounted to the receiver-transmitter in a separate box. The code element selectors protrude through this box to provide access for adjustment. To gain access to the unit remove the right hand cheek access door. This door must be unfastened for removal of the unit or to adjust the coding selector switches.

a. Code combinations are selected by manipulation of the coder switches.

Note

No switch position is supplied for the numeral "1". This numeral has been deliberately omitted from the coder switch panel because position number one is always ON. This position has therefore been made an integral part of the coder.

b. Code combinations should be selected in accordance with the typical combinations depicted in figure 4-13 of T.O. 12P5-2APN135-2 (Confid.).

1-23. CONTROL PANEL. (See figure 1-1.)

1-24. The control panel is recessed in the cockpit right hand wall below the ADF panel.

1-25. There are three power positions on the panel: OFF, STBY, and OPR. In addition there is a VOL control rheostat to regulate the signal level, and an amber TRANS ON light to indicate when the beacon is in the OPR position.

1-26. ANTENNA.

1-27. The antenna is centrally located on top of the A.R.S. fairing between and the HF radio long wire antenna.

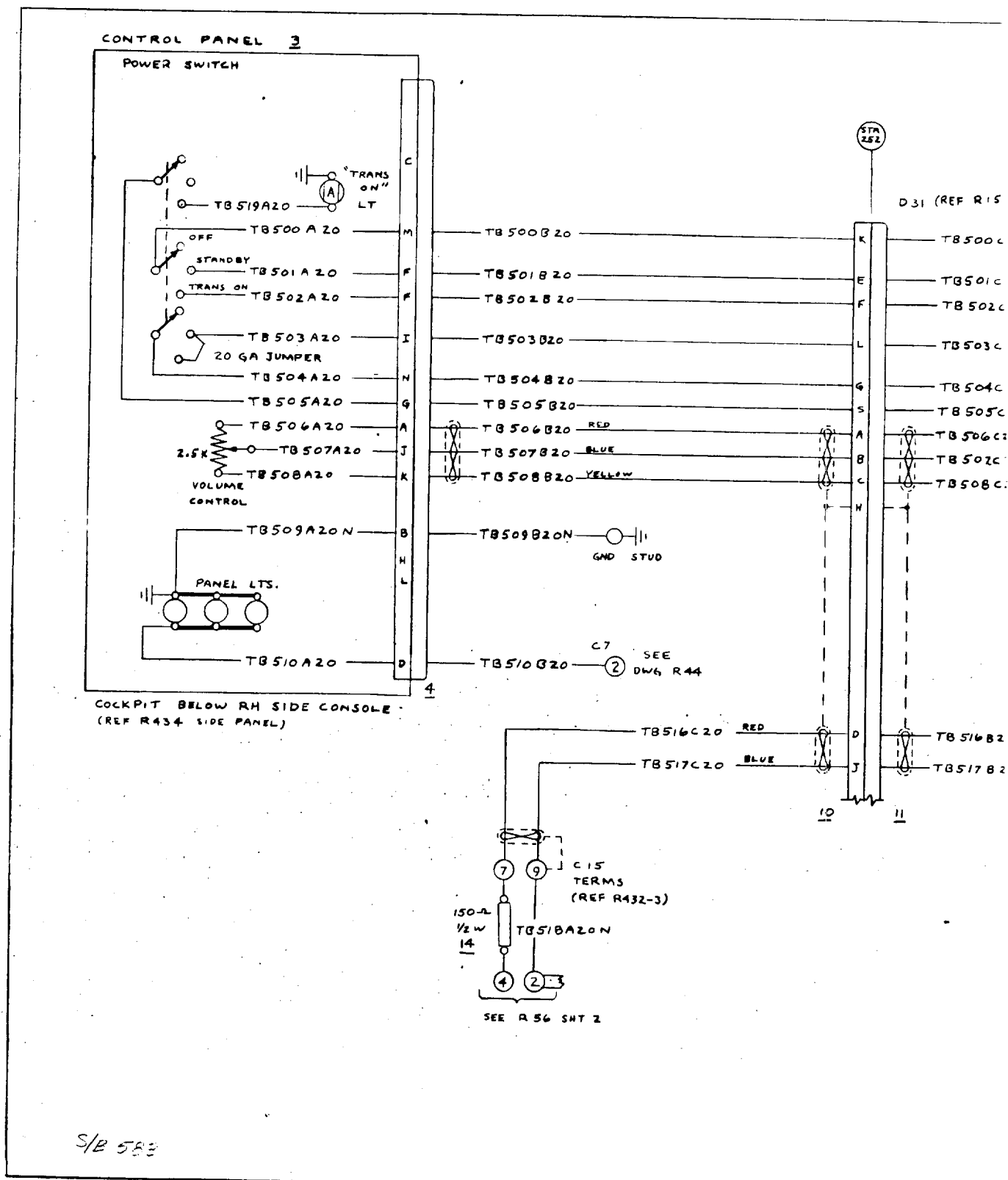


Figure 1-3. Circuit Diagram - Rendezvous Beacon APN-135 (Mod) (Sheet 1)

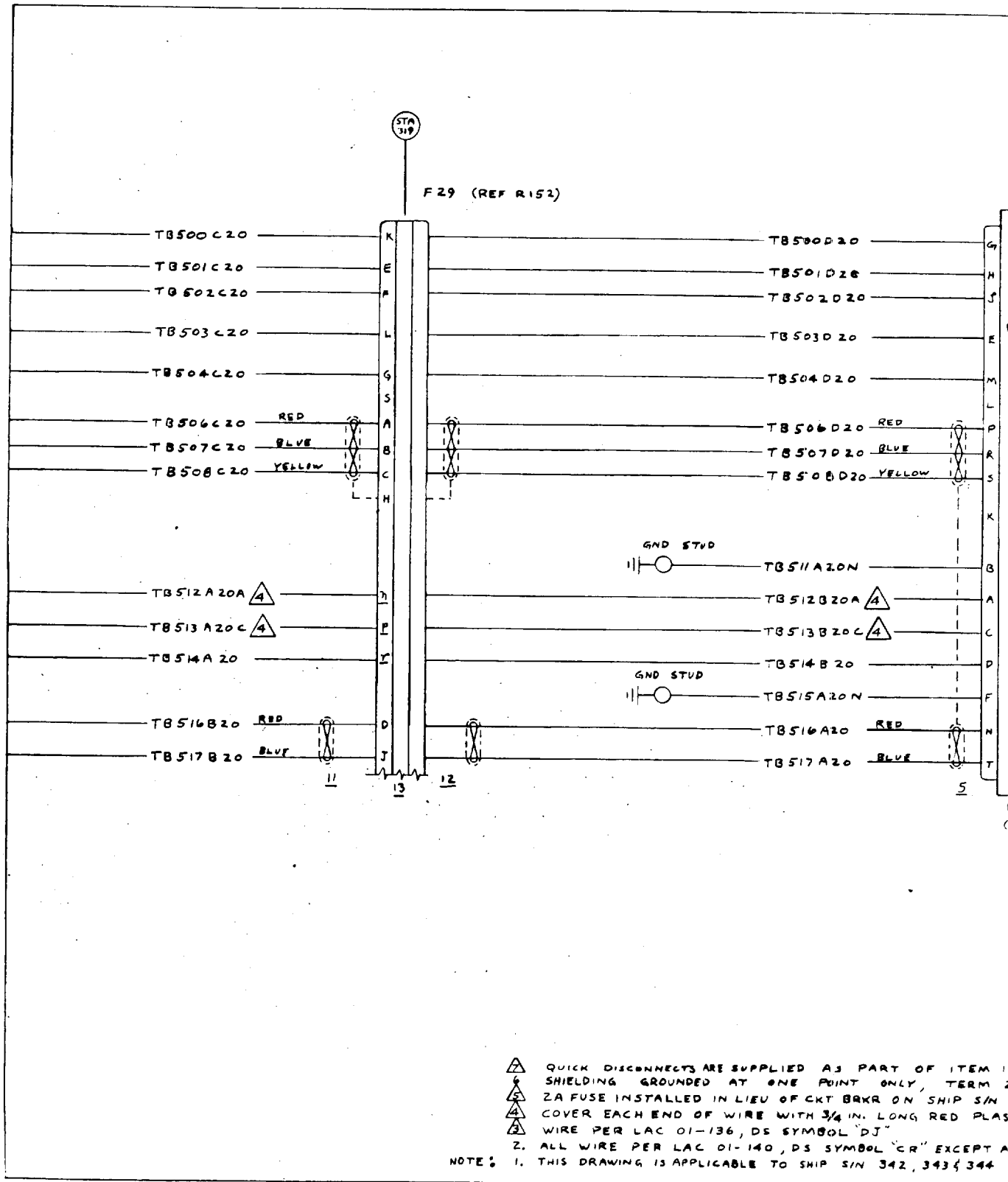


Figure 1-3. Circuit Diagram - Rendezvous Beacon APN-135 (Mod)(Sheet 2)

OPERATIONAL CHECKOUT

1-28. RENDEZVOUS RADAR BEACON.

1-29. SYSTEM CHECKOUT.

1-30. A quick test of beacon operation can be made by injecting a signal to pin H of J-1901.

Note

Refer to T.O. 12P5-2APN-135-2 (Confid), page 4-8 paragraph 4-27, for pulse width.

1-31. The signal amplitude is to be from -2 to -3 volts.

1-32. With all primary voltages supplied:

a. Place control switch in STBY position. Aural tone in aircraft intercommunication system should be audible.

b. Place control switch in OPR position. Aural tone in aircraft intercommunication system should be audible in from 0 to 90 seconds and amber TRANS ON light should illuminate.

Note

If aural signal is not audible with switch in each position, the unit should be removed for bench test trouble shooting.

TROUBLE SHOOTING

1-33. RENDEZVOUS RADAR BEACON.

1-34. SYSTEM TROUBLE SHOOTING.

1-35. Trouble shooting of the equipment installed in the aircraft is, in general, of the same type usually done on communication equipment.

1-36. Interconnecting wiring and associated equipment should be checked with reference to figures 1-2 and 1-3.

1-37. In isolating malfunctioning components, the tests in SYSTEM CHECKOUT should be made.

1-38. Once the defective component has been identified it should be replaced by one known to be in good operating condition.

1-39. Correction of trouble in components other than interconnecting wiring must be made by qualified personnel in the radar shop.

1-40. For data on this equipment refer to "T.O. 12P5-2APN135-2 (Confid), Technical Manual, Field Maintenance, Rendezvous Radar Beacon Set, AN/APN-135" as amended by Bendix-Pacific, "Addendum, Technical Manual, Field Maintenance, Rendezvous Radar Beacon Set, AN/APN-135 modified, Bulletin No. 10-0025."

MAINTENANCE

1-41. RENDEZVOUS RADAR BEACON.

1-42. GENERAL.

1-43. Maintenance of equipment when installed in the airplane is confined to inspections, removal, and installation of components. No adjustments, other than setting of coder switches, should be attempted on installed equipment.

1-44. RECEIVER-TRANSMITTER.

a. Removal.

(1) Remove right-hand cheek access door.

(2) Remove forward section of upper fuselage fairing.

a. Remove small access doors, left and right, in aft end of forward fairing.

b. Disconnect ARS light connector on L.H. wave guide bracket.

c. Unlatch quick disconnect at each end of transverse sections of rigid wave guide.

d. Lift fairing from fuselage.

(3) Remove flexible section of wave guide.

a. Unlatch quick disconnect at elbow at lower end of receiver-transmitter.

b. Remove six support clamps from structure. Note position of spacers with respect to length.

c. Carefully work wave guide out toward left side of airplane.

CAUTION

Handle guide carefully to avoid deformation.

d. Cap or tape open ends of guide sections. If tape is used, leave ends long so they may be readily seen to prevent inadvertent reconnection with tape in place.

(4) Disconnect electrical connector from coder on receiver-transmitter.

(5) Remove wiring support clamp and spacer from post on forward support assembly. Swing wiring clear.

- (6) Break quick disconnects on bonding jumpers.
- (7) Remove forward support screw at shock mount.
- (8) Remove both sections of front support structure.

Note

The set is now supported only by the aft bracket. Remove the two lower screws first then use a web strap for support while removing upper three screws.

- (9) When bracket screws are removed, lift set from bay.

CAUTION

This equipment weighs approximately 38 pounds. The wave guide elbow on the set is fragile. Do not allow set to drop while removing.

- (10) If the set is to be replaced, transfer aft bracket to the shock mounts of the replacement set.

b. Installation.

- (1) Lower set and bracket into position, being careful not to damage wave guide.
- (2) Install three upper screws in bracket. Do not tighten at this time.
- (3) Install two lower screws and tighten.
- (4) Tighten three upper screws.
- (5) Connect bonding jumpers.
- (6) Install forward sections of support structure and install screw in shock mount.
- (7) Install wiring support clamp and spacer. Connect electrical connector.
- (8) Install flexible section of wave guide.

a. Work guide into position from left side of airplane, being careful not to deform guide.

b. Remove caps or tape from ends of guides and latch lower quick disconnect. Check for proper seating of O-ring in elbow choke at receiver-transmitter.

c. Install support clamps.

Note

The uppermost clamp has no spacer. The next two have 1-inch spacers, the next a 3/4-inch spacer, and the lowermost, a 1/2-inch spacer.

1-45. ANTENNA.

a. Removal.

- (1) Remove long access panel from left side of center section of upper fuselage fairing.
- (2) Remove companion flange screws at aft end of longitudinal section of wave guide.
- (3) Remove access panel on which antenna is mounted.

CAUTION

Lift panel carefully in order to prevent damage to section of wave guide attached to antenna.

- (4) Make further disassembly as needed.
- (5) Cap or tape ends of wave guides and end of antenna.

b. Installation.

- (1) Install access panel with antenna and first section of wave guide assembled.

CAUTION

Move panel into position carefully. Wave guide is fragile.

- (2) Remove caps or tape, check for proper seating of O-ring, and install companion flange screws.

1-46. RIGID WAVE GUIDE SECTIONS.

a. Removal.

- (1) Remove forward transverse section.

a. If section aft of this is also to be removed, remove forward section of upper fairing.

b. Remove two support clamps.

c. Cap or tape ends of guides.

(2) Remove longitudinal section. (Front section of upper fairing removed.)

a. Remove companion flange screws at aft end.

b. Remove two support clamps.

c. Rotate guide so aft flange is up. This makes it possible to pass elbow and flange through bulkhead cutout when guide is moved forward.

d. Cap or tape ends of guides.

b. Installation.

(1) Install longitudinal section.

a. Remove caps or tape. Check for proper seating of O-ring in mating parts.

b. Reverse procedure for removal.

(2) Install forward transverse section.

a. If forward section of upper fairing is removed, install wave guide in it before installing fairing.

b. Support guide with two clamps.

c. After fairing is installed, remove caps or tape, check O-rings, and latch quick disconnects. Adjust guide in clamps as necessary for alignment.

1-47. PREPARATION FOR USE.

1-48. If the airplane is to be flown without the receiver-transmitter installed, it is recommended that the antenna and rigid sections of the wave guide be left in the airplane, and the open end of the guide be capped or taped. The weight of these parts is negligible and if not removed, precludes possible damage in handling and storage of parts.

1-49. Never release the airplane for flight with the outboard end of the section of wave guide between the antenna and the longitudinal section of guide disconnected. The section from the antenna depends on this connection for support.

a. Secure equipment for operation.

- (1) Check all supports in wave guide installation for security.
- (2) Install left side access panel on center section of upper fairing.
- (3) Install forward section of upper fairing, if not yet installed.
 - a. Remove caps or tape, and latch wave guide quick disconnects.
 - b. Connect ARS light connector.
 - c. Install two small access doors in aft end of forward fairing.
- b. Before installing panel in right cheek make ground check of system.
- c. Install right cheek access panel.

1-50. ALIGNMENT AND ADJUSTMENT.

1-51. Alignment and adjustment of this equipment is a bench test operation requiring laboratory test equipment.

1-52. Bench tests should be accomplished in accordance with instructions contained in T.O. 12P5-2APN135-2 (Confid) as modified by "Bendix-Pacific, Addendum, Technical Manual, Field Maintenance, Engineering Bulletin No. 10-0025, AN/APN-135 Modified."

1-53. CODER.

1-54. CODE SELECTION AND SETTING.

- a. Select code combinations per figure 4-13, T.O. 12P5-2APN135-2 (Confid).
- b. Actuate switches on coder to set in selected code.